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(71) Applicant: **Becton Dickinson and Company**  
**Franklin Lakes, New Jersey 07417-1880 (US)**

(72) Inventors:  
• **Gordon, Tim H.**  
**River Vale, New Jersey 07675 (US)**

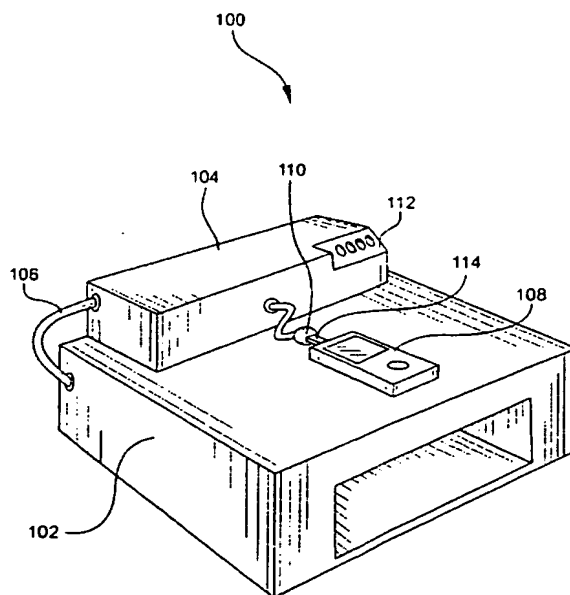
• **Gisler, Scott W.**  
**Pine Brook, New Jersey 07058 (US)**  
• **Puma, Michael**  
**Midland Park, New Jersey 07432 (US)**  
• **Yao, Raymond L.**  
**Hoboken, New Jersey 07030 (US)**  
• **Cassigneul, Pierre**  
**Flemington, New Jersey 08822 (US)**

(74) Representative:  
**von Kreisler, Alek, Dipl.-Chem. et al**  
**Patentanwälte,**  
**von Kreisler-Setting-Werner,**  
**Bahnhofsvorplatz 1 (Deichmannhaus)**  
**50667 Köln (DE)**

(54) **Printing device for personal medical monitors**

(57) A printing device is provided to increase the benefit to patients and healthcare professionals of personal medical monitoring devices, such as blood glucose meters. The printing device receives and analyzes data from a personal medical monitoring device, such as a blood glucose meter, and generates an output based on analysis of the data. The output may include a log of the data entries, or graphical representations of the data, such as pie charts, line charts, histograms, and the like. Furthermore, the data analysis performed by the device can comprise applying therapy rules to the data. In this manner, the device is capable of and providing therapy recommendations in the output based on the analysis of data and application of therapy rules, and to thereby provide therapy guidance for a patient and their respective health care professional.

FIG. 1



ual feedback on the status of the system. The status indicators 112 indicate, among other things, whether the system 100 is in an idle ready state, whether the system 100 is connected to a personal medical monitor 108, whether the system 100 is presently printing, or whether the printer 102 needs maintenance. The personal medical monitor 108 has an interface connector 114 which is adapted to be connected to the interface cable 110 in order to facilitate data transfer between the personal medical monitor and the electronics package 104.

**[0017]** Figure 2 illustrates a second embodiment of a system 200 according to the present invention. In this embodiment, the electronics package 104 is integrated into the body of the printer 102. Furthermore, the interface cable 110 is replaced by an interface 202 which is also integrated into the body of the printer 102. The interface or port 202 (which can consist of a plug-and-socket arrangement, for example) facilitates data transfer from the personal medical monitor 108 through the interface connector 114 of the personal medical monitor 108 when the personal medical monitor 108 is connected to the interface 202.

**[0018]** Figure 3 illustrates a third embodiment of a system 300 according to the present invention. In this embodiment, the printer 102 and personal medical monitor 108 are provided with antennas 302, 204 to facilitate wireless data transfer between the personal medical monitor 108 and the electronics package 104 of the printer 102.

**[0019]** Figure 4 is a block diagram of a system 400 according to the present invention. The output device 402 preferably comprises a printer 404 and electronics 406. The printer 404 preferably receives paper 408, toner or ink 410 and power 412. The paper 480 can preferably be plain paper in a standard format, such as 8.5" x 11", or A4 sized paper. The paper also may be printed letterhead paper, or have other pre-printed information on it, such as promotional or instructional information, which is not dependent on the data. Of course, one of skill in the art will readily appreciate that the invention is not limited to any particular form factor of paper, and furthermore, the invention is contemplated to be useful in connection with a wide variety of printing and display technologies. The printer 404 is preferably a laser printer, and uses toner 410 to print pages. However, the invention is not limited to laser printers, and any printer such as an inkjet printer, or any other type of output device, including CRT and LCD displays, is considered to be within the scope of the invention. The printer 404 preferably uses standard 120V AC power 412, such as is available in most wall outlets. However, other power sources may be used, as would be convenient and appropriate in a given situation, and any appropriate power supply is considered to be within the scope of the invention. Furthermore, the output device 402 could be powered by batteries (not shown) in lieu of an outside power source.

**[0020]** The electronics 406 perform a number of

tasks. Among them, the electronics 406 manage the transfer of data from a blood glucose monitor 414 when a blood glucose monitor 414 is connected to the device 402. Preferably, the electronics are adapted to recognize when a blood glucose monitor 414 has been connected to the output device 402, and begin effectuating a data transfer without any intervention by the user. In the preferred embodiment, the output device 402 has an interface 202 incorporated therein, comprising a physical interface for receiving data from the blood glucose monitor 414. The blood glucose monitor 414 has a corresponding interface 114 adapted to fit the interface 202 of the output device 402, and the user simply inserts the blood glucose monitor 414 into the interface of the output device 402 to begin a data transfer and print operation.

**[0021]** In a preferred embodiment of the invention, the printer 404 has any necessary driver software and configuration software required to interface with a bodily fluid chemistry analyzer pre-installed prior to delivery to an intended user, such as a health care professional's office. This is referred to herein as being pre-configured. Thus, in this embodiment, once the printer 404 is delivered to the user's location, all that is required to use the device is to power it up and connect a blood fluid chemistry analyzer. The driver and configuration software 416 are preferably contained in the electronics 406 of the printer as shown in Figure 4. Alternatively, they could be stored on a computer readable media, which is adapted to be accessed by the electronics 406.

**[0022]** In another embodiment, the output device 402 comprises a wireless transceiver (not shown) for communicating with a blood glucose monitor 414 having wireless communication ability. The output device 402 is outfitted with a Bluetooth or WiFi (IEEE 802.11b protocol) wireless device, or the like, which provides an alert to the electronics 406 when a blood glucose monitor 414 is within range for wireless communication. Of course those of skill in the art will readily appreciate that the invention is not limited to any particular wireless technology, and could include, among other technologies, any custom or proprietary magnetic, RF, or infrared wireless communication protocol. The electronics 406 then establish a communication link with the blood glucose monitor 414, which allows data to be transferred to the output device 402 by wireless means. In one embodiment the blood glucose monitor 414 is adapted to provide an alert to the user which indicates that a connection with the output device 402 is available. By pressing a button on the blood glucose monitor 414, or otherwise indicating a desire to transfer data to the output device, a data transfer from the blood glucose device 414 to the output device 402 is caused.

**[0023]** The electronics 406 are further adapted to format printed pages based on the received SMBG data, generate graphical representations of data, such as pie charts, histograms, and the like, and to further format any information which is to be printed. The electronics

**[0032]** If during step 720, it is determined that glucose and insulin data was downloaded, program flow continues to step 726, in which an LED is solidly lit, while printed pages are produced at step 728. The format and content of printed pages is described generally at 730. Status and error conditions are also preferably indicated by controlling a set of LED's, as indicated generally at 734. At step 716, when all pages to be printed have completed printing, the progress LED is turned off. Program flow concludes at step 732, at which point program flow preferably loops back to the start, at step 700.

**[0033]** While the invention herein disclosed has been described by means of specific embodiments and applications thereof, numerous modifications and variations can be made thereto by those skilled in the art without departing from the scope of the invention.

### Claims

1. A printing device for use with a body fluid chemistry analyzer, comprising:
  - a communication port adapted for communication with a body fluid chemistry analyzer; and
  - a printing device adapted to be controlled by a processor, wherein said processor is adapted to, in response to a single action by a user, retrieve body fluid chemistry data from said body fluid chemistry analyzer, format said data, and print said formatted data.
2. The printing device of claim 1, wherein said printing device has a set of drivers for interfacing with said body fluid chemistry analyzer pre-installed prior to delivery to an intended user.
3. The printing device of claim 1, wherein said single action comprises connecting said body fluid chemistry analyzer to said communication port.
4. The printing device of claim 1, wherein said body fluid chemistry analyzer comprises a blood glucose monitor.
5. The printing device of claim 1, wherein said communication port is a wireless communication port, said printing device further comprising a monitoring circuit adapted to poll for an available wireless communication device, to establish a communication link with said available wireless communication device, and to provide an alert to said user indicating the presence of said wireless communication device, and wherein said single action comprises responding to said alert.
6. The printing device of claim 1, wherein said wireless communication port comprises an infrared port.
7. The printing device of claim 1, wherein said wireless communication port comprises an IEEE 802.11 port.
8. The printing device of claim 1, wherein said wireless communication port comprises a Bluetooth port.
9. The printing device of claim 1, wherein said processor is further adapted to generate charts from said data, and to print said charts in response to said single action.
10. A method of retrieving and printing stored blood chemistry data comprising the steps of:
  - in response to a single action by a user, retrieving body fluid chemistry analyzer data from a body fluid chemistry analyzer through a communication port of a printing device,
  - formatting said data, and
  - printing said formatted data.

FIG. 2

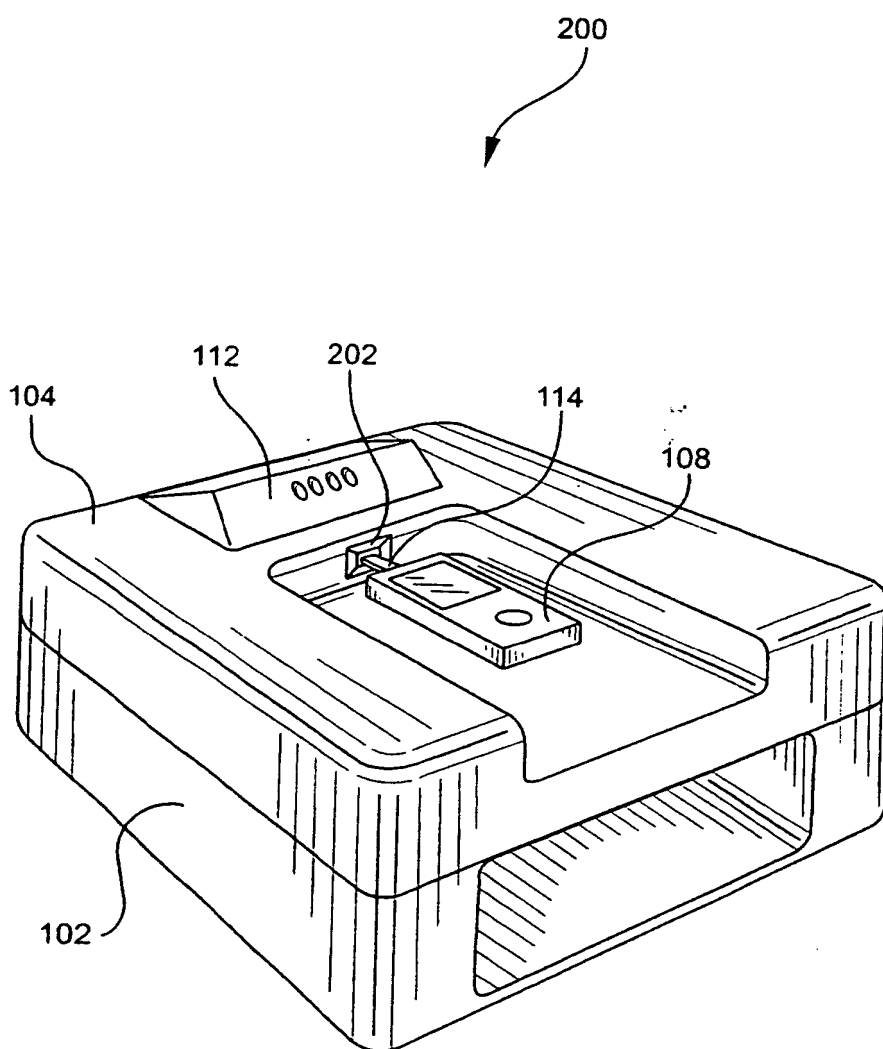


FIG. 4

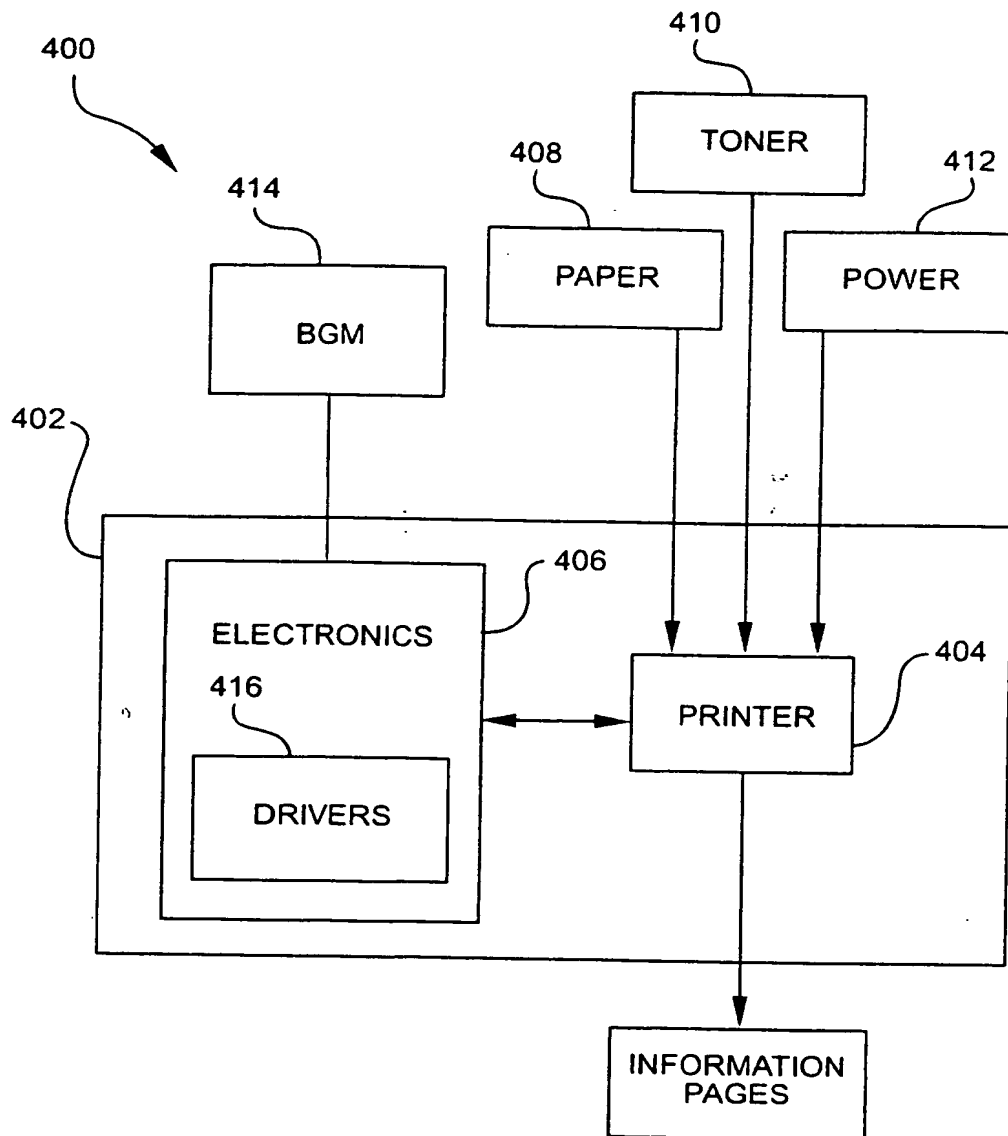


FIG. 6A

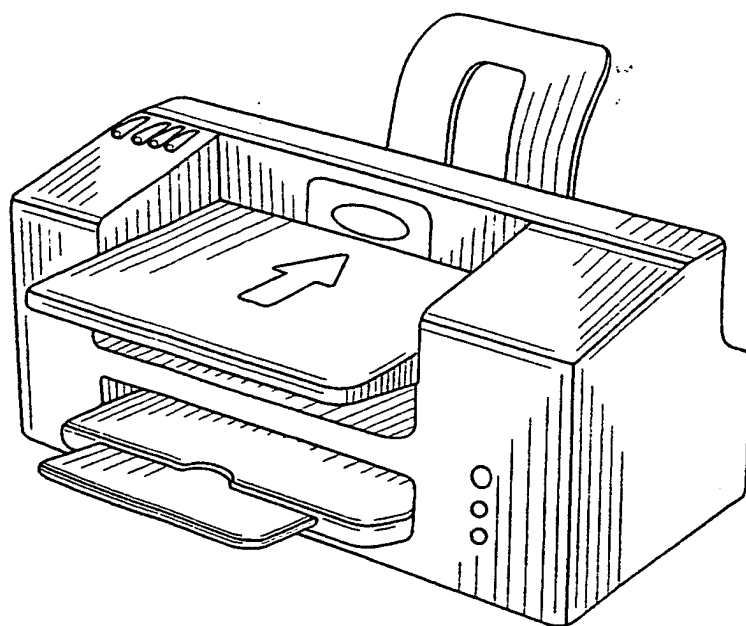


FIG. 6C

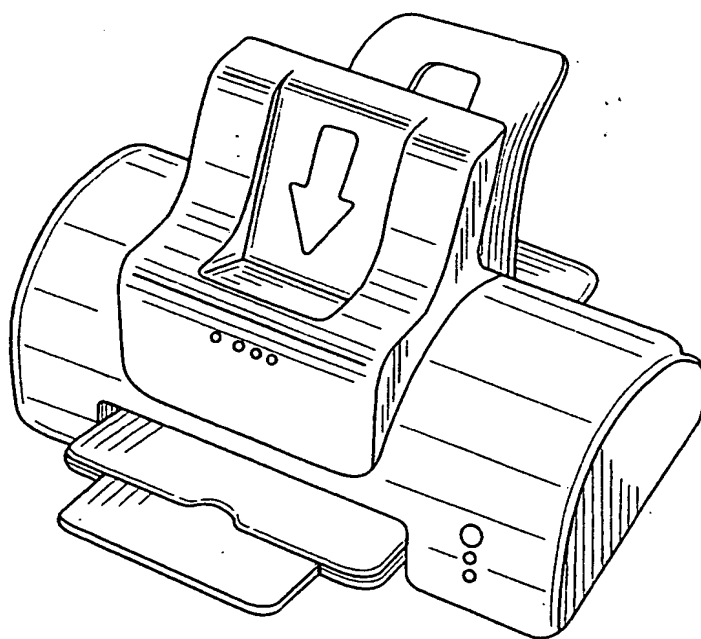


FIG. 7B

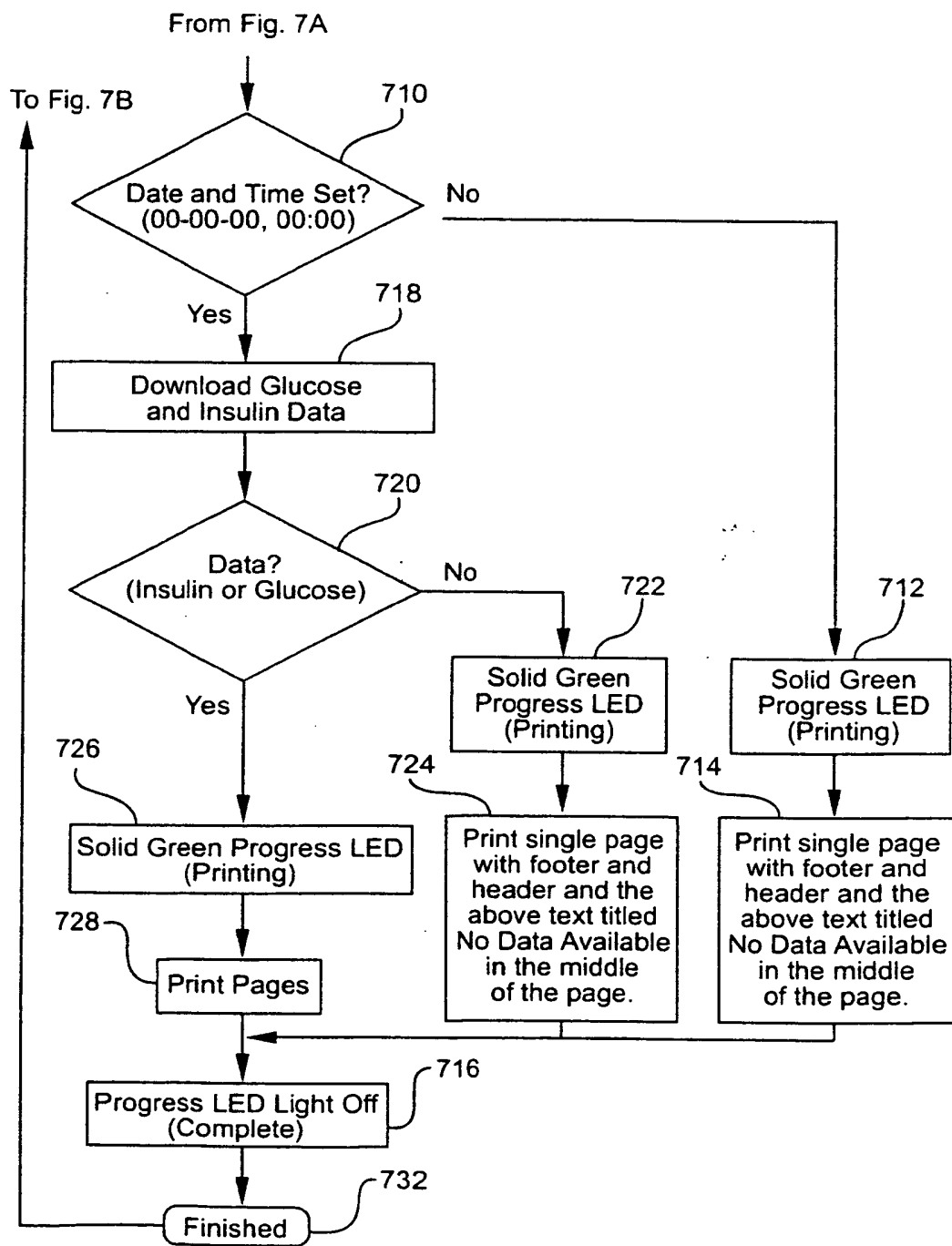




FIG. 7D

734 {

Condition	Action
1. Paper Out (Add Paper)	1. Steady Paper LED.
2. Black or Color Ink Out (Look at front and replace appropriate cartridge)	2. Steady Ink LED.
3. Data Transfer Error	3. Steady amber Progress LED. Reset after 10 seconds.
4. Paper Jam	4. Blinking Paper LED.
5. Unknown Problem (Printer Offline, etc.)	5. Progress, Ink and Paper LED's all blinking.
6. Data Transfer in Progress	6. Blinking green progress LED.
7. Printing in Progress	7. Solid green Progress LED.

Power	Progress	Paper	Ink

No Date/Time Available Test

No Date/Time Available

The date and time must be set in the monitor in order to print the data.

See your BD Transistor user guide for instructions on setting the date and time.

No Date Available Test

No date available

Either there are no glucose or insulin readings stored in your monitor, or your most recent reading was taken without the date and time set.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 02 8252

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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18-02-2003

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